

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, DC 20554

In the Matter of	)	
	)	
The Impact of the Global Semiconductor Shortage on the	)	WT Docket No. 21-195
U.S. Communications Sector	)	
	)	

**COMMENTS OF INTEL CORPORATION**

**Introduction**

Intel Corporation welcomes the opportunity to provide comments to the FCC on the above mentioned proceeding. Intel is a leading global semiconductor supplier; our processors, memory, storage, and other products power much of the world’s computing capability. Intel is also a leading silicon provider for 5G and Wi-Fi products.

**Semiconductor Shortage**

According to the Semiconductor Industry Association, the semiconductor industry directly employs nearly a quarter of a million workers in the United States, and US semiconductor company sales totaled \$208 billion in 2020. Yet even at this scale, the demand for semiconductors in today’s innovation economy continues to outstrip supply. As the world strives to move past the economic turbulence created by the COVID pandemic, it is crucial that U.S. businesses and policymakers identify ways to be better prepared for the future.

At the outset of the pandemic, certain vertical industries saw severe reductions in demand for goods and services, leading them to reduce inventories of supplies and to reduce their forecasts for semiconductors. Later in 2020, retailers and manufacturers were caught off-guard by demand surges as consumers sought to buy cars and appliances, and as infrastructure managers sought to expand networks. The semiconductor shortage is impacting the communications sectors as well as many other sectors, and lead times have been extended.

### **Factors Impacting Supply**

Although the COVID pandemic exacerbated the problem, it is not the most important cause. To better define the drivers behind today's shortages, the Biden Administration issued Executive Order 14017 on America's Supply Chains<sup>1</sup> to detail causes and recommended steps to address the nation's semiconductor supply needs. This week the White House released findings from its 100 Day report on critical supply chains. The Fact Sheet for the report captures the situation:

Once a global leader in semiconductor production with robust public support, the United States has outsourced and offshored too much semiconductor manufacturing in recent decades. The United States has fallen from 37 percent of global semiconductor production to just 12 percent over the last 20 years. The United States also lacks production capability at the most advanced technology levels. For leading edge logic chips, the U.S. and U.S. allies rely primarily on facilities in Taiwan, which produces 92 percent of such chips. Our reliance on imported chips introduces new vulnerabilities into the critical semiconductor supply chain. The United States produces only six to nine percent of the more mature logic chips, which are severely impacted by the current

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<sup>1</sup> <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/02/24/executive-order-on-americas-supply-chains/>

shortage. The loss of production capacity threatens all segments of the semiconductor supply chain as well as our long-term economic competitiveness.<sup>2</sup>

Intel is doing its part. Over the past several years, we have made substantial capital expenditures to significantly increase capacity. Earlier this year, Intel announced significant expansions in the U.S., including investments of \$20 billion in Arizona to provide committed capacity for large-scale foundry operations and \$3.5 billion in New Mexico to expand Intel's U.S.-based manufacturing and advanced packaging capabilities.

Intel has also worked with affected industries to identify areas where Intel can help, but short-term, widespread solutions are unlikely for a variety of reasons. Many products use application-specific, unique chip designs, which makes it difficult to substitute chips with better availability. Also, semiconductor designs are not easily transferrable across different foundries – so even if a U.S. fabrication plant had spare capacity, a chip may require modification and testing before it could be transitioned into production from an overseas foundry. In addition, some semiconductor designs have very long lifecycles (e.g., 5-10 years), making it very difficult to make even simple changes that might be required to switch from one foundry to another. Shortages of substrates and extended lead times for manufacturing tools are also posing challenges.

### **Steps to Take**

Industry can work together to try to mitigate future semiconductor shortages with greater coordination and planning between affected industries and manufacturers. For example, improved communication between foundries and integrators may help integrators reduce the likelihood and impacts of late order cancellations and help foundries reduce lead times for

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<sup>2</sup> <https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf>

orders. Also, especially for lower cost semiconductors, integrators may need to carry more inventory. Device integrators dependent on older fab technology may want to update chip designs to allow greater flexibility and to take advantage of newer manufacturing technology. The Administration's 100 Day Report on semiconductor supply chain highlights the need for designs to keep pace with updates to manufacturing infrastructure:

Between 2009 and 2018, more than one hundred 150-200 mm fabs closed worldwide with 70 percent of the closure locations in the United States and Japan. According to IC Insights, many of the fabs had been used for decades and had outlived their useful purpose. In some cases, they were replaced by more cost efficient or upgraded facilities.<sup>3</sup>

Forecasts of the duration of today's chip shortages vary from months to a couple of years, and most agree that market forces will address the immediate shortages for specific categories of chips. For the longer term, however, the U.S. must act to address the underlying trends that caused the erosion in US-based capacity including:

- Cost Disadvantages – U.S.-based manufacturers face a 25% to 40% cost disadvantage compared to competitors in Asia.
- Impact of foreign investment – Investment in non-US manufacturers by foreign governments of tens of billions of dollars to help develop domestically-owned semiconductor manufacturing and advanced packaging.
- Insufficient support for R&D – Inadequate U.S. government support of R&D for advanced logic and advanced packaging.

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<sup>3</sup> <https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf>

- Other policies impacting business competitiveness – Under-investment in workforce development, and trade policy and regulatory actions which hurt U.S. semiconductor firms’ competitiveness in the global marketplace.

## **Conclusion**

Intel appreciates the opportunity to offer these comments for the FCC’s consideration, and we look forward to working with network operators, communication equipment manufacturers, cloud service providers, and others on addressing their needs for adequate, resilient semiconductor capacity for networks. The Biden Administration and the Commerce Department have taken important steps forward to address the problems in their 100 Day report. This week, the U.S. Senate took important steps in appropriating funds for U.S.-based semiconductor manufacturing and R&D in the U.S. Innovation and Competition Act, and the U.S. House of Representatives will now address these issues.

Respectfully submitted,

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